POZNAŃ UNIVERSITY OF ECONOMICS AND BUSINESS
Research Papers in Economics and Finance *Vol. 9, No. 2, 2025: 75–96*
https://ref.ue.poznan.pl *https://doi.org/10.18559/ref.2025.2.2658*

Do agency costs matter? Evidence from Egypt on the capital structure-performance nexus

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Abstract

This study has two main objectives: (i) to explore the relationship between capital structure (CS) and firm performance (FP) among non-financial firms listed on the Egyptian Exchange (EGX30), and (ii) to analyse how agency costs (AC) influence this relationship as a moderator. The research uses panel least squares (PLS) to examine how AC affects the association between CS and FP. The sample includes 200 firm observations annually from 20 non-financial firms listed on the Egyptian Stock Exchange (EGX30) from 2014 to 2023. The debt-to-equity ratio (D/E) measures CS, while return on equity (ROE) assesses FP. The asset utilisation ratio (AUR) gauges AC. Results indicate that CS positively affects FP. Additionally, AC demonstrate a positive moderating effect on the relationship between CS and FP. To the best of the authors' knowledge, this is the first study to examine the moderating influence of AC on the association between CS and FP in Egypt.

Keywords

- capital structure
- firm performance
- agency costs
- panel least squares
- EGX30

Article received 1 September 2025, accepted 16 November 2025.

Suggested citation: El Mahdy, A. H. A. M., & Samir, N. A. (2025). Do agency costs matter? Evidence from Egypt on the capital structure-performance nexus. *Research Papers in Economics and Finance*, *9*(2), 75–96. https://doi.org/10.18559/ref.2025.2.2658

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Introduction

The need for financing in any enterprise is not dependent on the firm's age. Capital is a vital element for a company at any stage of its growth. This funding is known as capital structure (CS) (Chechet & Olayiwola, 2014). CS refers to the ratio of debt to equity that a company chooses to fund its growth, operations and future projects. It plays a crucial role in determining a company's market position concerning risk and return. Finding the best CS is a continuous process where companies must regularly evaluate the costs and benefits of various funding options. An ideal CS maximises the firm's value while minimising costs (Chadha & Sharma, 2015). Reaching the right CS requires a cautious balance between the advantages and disadvantages of debt and equity. Although previous studies (Ayaz et al., 2021; Ogebe et al., 2013) suggest that organisations can find an optimal CS, decades of research have yet to produce a clear framework for achieving it.

The Financial Regulatory Authority (FRA) in Egypt has set standards for the CS of non-financial companies. These guidelines include details on minimum capital requirements and transparency rules. The FRA Decree No. 91 of 2023 states that the minimum capital requirement for leasing and factoring companies is EGP 75 million. The FRA Decree No. 196 of 2024 outlines the minimum capital requirements for insurance businesses, which vary depending on the type of insurance license. Disclosure regulations require regular reporting of information about CS, debt issuance and any changes in a firm's paid-in capital.

The relationship between CS and firm performance (FP) has been a subject of debate since Modigliani and Miller proposed in 1958 that a firm's value is unaffected by its CS; however, the assumptions behind this theory are impractical (Iavorskyi, 2013). In 1963, the two authors revisited their work and took into account the impact of corporate tax, highlighting the importance of interest payments that are tax-deductible.

Since then, other theories have been developed, including the Tradeoff Theory, which suggests that firms try to reach a target debt ratio, the Pecking Order Theory, which highlights the best hierarchy for obtaining financing from the cheapest to the most expensive choice, as well as the Agency Theory, which states that the use of leverage keeps managers from making decisions that will primarily benefit them resulting in lower agency costs (AC) (Tudose, 2012). All of these theories are meant to further clarify the association among CS, FP, and AC.

Previous research has identified various factors that influence CS and alter the debt-to-equity ratio (D/E). The primary factor is firm size (FS), a key determinant of CS, because larger firms generally use a higher proportion of debt in their financing due to their ability to reduce risk, in line with the trade-off theory (Ahmed Sheikh & Wang, 2013; Chen et al., 2014; Ghosh, 2017). The second factor is liquidity

(LQ), which refers to a firm's ability to convert assets into cash quickly. It is generally easier for more liquid companies to obtain external financing (Ghasemi et al., 2016). The third factor is tangibility (TG), since physical assets make it more economical to acquire debt due to their potential as collateral. The higher the value of tangible assets, the more confidence lenders have regarding the recovery of their outstanding amounts (Ernawati & Murhadi, 2013). The last factor is business risk (BR), as higher-risk firms should rely more on equity financing, whereas firms with lower risk and financial distress should rely more on debt financing (Chen et al., 2014). BR also tends to increase then decrease as it has a quadratic relationship with leverage (Ghosh, 2017).

While CS can support a firm's optimal performance, it can also lead to its downfall. Evidence of this is witnessed in companies that were once among the largest globally. Kmart was once one of the leading bargain retailers in the United States. The problem stemmed from increased competition from rivals like Target and Walmart, which were establishing themselves as market leaders. Kmart filed for bankruptcy on January 22, 2002, due to intensified price cuts, declining sales and numerous defaulted bonds (Stowell & Stowell, 2017). Toys R Us was once among the top toy retailers worldwide. After its share price fell from $45 to about $23–$24, and following a $6.6 billion leveraged buyout with roughly $450 million in annual interest payments, the company was forced to declare bankruptcy in 2017 (Morgan & Nasir, 2021).

The contributions of previous literature on this topic are significant; however, they have consistently yielded conflicting results. Several studies indicated that in Bangladesh, Ukraine and Vietnam, CS negatively impacted FP, regardless of the measurement methods used (Iavorskyi, 2013; Nguyen & Nguyen, 2020; Rouf, 2015). Conversely, many studies in Malaysia, Jordan, India, Egypt, Pakistan and Sri Lanka yielded inconclusive results (Al-Taani, 2013; Ayaz et al., 2021; Chadha & Sharma, 2015; Muhammed & Shah, 2014; Sakr & Bedeir, 2019; Salim & Yadav, 2012). Despite decades of debate about the relationship between CS and FP, finding a definitive answer on how CS influences FP remains challenging. Furthermore, few studies have examined this topic in Egypt. This research will analyse the influence of CS on FP, considering the moderating effect of AC in Egypt.

This research advances the existing literature by providing valuable insights into corporate behaviour where significant economic reforms and macroeconomic changes occurred throughout the study period. Ultimately, by using AC as a moderating variable, the study sheds light on how conflicts between managers and shareholders may impact financing decisions and FP.

This research includes the following sections: Section 1 covers the literature review and hypothesis development. Section 2 describes the sample used and the specification of the model. Section 3 explains and discusses the statistical results. Finally, there are conclusions, implications, limitations and recommendations for future research.

1. Literature review

This section offers a thorough examination of the conceptual foundations and theoretical frameworks supporting this investigation. It specifically addresses the independent variable (CS), the dependent variable (FP) and the moderating variable (AC), subsequently reviewing the relevant theories that clarify their interconnections.

1.1. Capital structure

CS, which explains how a corporation finances its operations, investments and growth through a mix of debt and equity, is crucial in determining firm value (Muhammad & Shah, 2014; Salim & Yadav, 2012). These financing options have significant effects, directly influencing the interests of various stakeholders, including shareholders, creditors and management (Sakr & Bedeir, 2019). Debt typically includes instruments like loans, bonds, debentures and notes payable, while equity covers common and preferred shares (Chadha & Sharma, 2015; Dada & Ghazali, 2016). Poor CS decisions can lead to higher costs of capital, which reduces the net present value (NPV) of investment opportunities and makes them less attractive financially. A properly balanced CS lowers the cost of capital, increases project NPV, and ultimately helps maximise firm value (Rouf, 2015).

1.2. Firm performance

The primary reason for establishing a firm is to maximise shareholder wealth and overall firm value. To reach these goals, companies consistently strive to enhance their performance. Evaluating FP is vital for ensuring continuous progress by providing insights into operational efficiency and financial health. This evaluation ultimately helps identify areas where the company needs improvement and enhances the decision-making process. Regular assessment of performance is essential because it allows companies to adapt to market changes, allocate resources effectively and improve business operations. These efforts ultimately lead to sustainable corporate growth (Rohim et al., 2024). To assess FP, financial reports are carefully analysed, as they contain comprehensive information about FPs across various financial aspects, which can be examined through different financial ratios. These ratios reveal the company's liquidity, solvency, profitability and market value (Maysuri & Dalimunthe, 2018).

1.3. Agency costs

AC arises because of a conflict of interest between managers and shareholders due to the separation of ownership and management (Pranata & Nugroho, 2025). This separation leads managers to diverge from the ultimate objective of maximising the value of the firm, as they are more prone to act in their interest (Rohim et al., 2024). Monitoring expenses, bonding costs and residual losses are different types of AC. Monitoring costs are the expenses related to making sure management acts in the best interests of investors, such as hiring an external auditor. Bonding costs are expenses incurred to prevent managers from engaging in certain behaviours. A bond covenant, which is part of the bonding costs, restricts the corporation from taking specific actions. Lastly, residual losses are the costs paid when a conflict of interest between managers and investors arises, even when monitoring and bonding measures are in place (Sapuan et al., 2021).

1.4. Theoretical framework

This section discusses three theories about the relationship between CS and FP: the Modigliani-Miller theory, the trade-off theory and the dynamic trade-off theory. It also covers two theories about the moderating effect of AC on the relationship between CS and FP: the pecking order theory and agency theory.

1.4.1. CS and FP theories

The relationship between CS and FP has long been a central topic in corporate finance. Three primary theories explain this relationship: the Modigliani-Miller theorem, the trade-off theory and the dynamic trade-off theory. The Modigliani-Miller hypothesis, first introduced by Modigliani and Miller in 1958, marks the initial formal analysis of how CS influences a firm's value. Based on a set of idealised assumptions, such as excluding taxes, transaction costs and information asymmetry, the theory states that a firm's value is unaffected by its CS and is instead determined by its earning potential and risk profile (Dao & Ta, 2020). However, these assumptions greatly limit the theory's practical applicability. In 1963, Modigliani and Miller adjusted their framework to include corporate taxes, arguing that companies can increase their value by using debt to benefit from tax-deductible interest payments. However, implementing this revised theory in practice remains limited, especially for smaller businesses (Magoro & Abeywardhana, 2017).

The trade-off approach, developed by Kraus and Litzenberger in 1973, challenges the Modigliani-Miller assumptions by recognising that firms weigh the benefits

of debt, such as the tax shield, against its costs, including financial hardship. This viewpoint suggests that each firm has an optimal CS, and deviations from this target require adjustments to restore balance (Singh & Kumar, 2008).

The dynamic trade-off theory incorporates time as a key factor in CS decisions. It emphasises the speed of adjustment (SOA), a metric indicating how quickly firms return to their target leverage after fluctuations. This approach captures the complex realities of corporate financing behaviour, recognising that firms do not instantly achieve or maintain optimal capital structures (Abdeljawad et al., 2013).

1.4.2. CS, FP and AC theories

The Pecking Order Theory was developed by Stewart Myers and Nicolas Majlouf in 1984 (Singh & Kumar, 2008). This theory suggests that companies prefer specific funding sources. The order of financing preference starts with internal funds, then debt, and finally equity, with short-term debt preferred over long-term debt. This preference arises from the information asymmetry between managers and investors, which increases the cost of capital, making retained earnings the most cost-effective source of financing (Chen & Chen, 2011).

The Agency Theory was introduced by Jensen and Meckling in 1976. The researchers argued that eliminating costs arising from conflicts between managers and shareholders allows a firm to achieve an optimal CS. This can be accomplished by holding a level of debt that encourages managers to act in the company's best interests, since taking on debt requires meeting those debt obligations (Chechet & Olayiwola, 2014).

1.5. Empirical review

This section indicates empirical studies investigating the impact of CS on FP, as well as the moderating influence of AC within this context. The examined studies (Ayaz et al., 2021; Chadha & Sharma, 2015; Do et al., 2022; Iavorskyi, 2013; Mathur et al., 2021; Nguyen & Nguyen, 2020; Pandey & Sahu, 2017; Rouf, 2015; Sakr & Bedeir, 2019) encompass numerous countries and sectors, demonstrating inconsistent outcomes, hence highlighting the necessity for additional research, especially in developing markets like Egypt.

1.5.1. Capital structure and firm performance

Nguyen and Nguyen (2020) examined the influence of CS on FP in Vietnam. The data was obtained from 488 non-financial firms spanning the years 2013 to

2018. Short-term obligations, long-term liabilities and the ratio of total liabilities to total assets were utilised to assess CS. Return on assets (ROA), return on equity (ROE) and earnings per share (EPS) were used to assess FP. The findings indicated that CS negatively impacts FP. This is attributed to high loan rates that lead to low business results. Additionally, Rouf (2015) examined the impact of CS on FP in Bangladesh, utilising data from 106 manufacturing firms between 2008 and 2011. The indicators for CS were the debt ratio, current debt ratio, debt-to-equity ratio, proprietary equity ratio, as well as the ratio of current assets to proprietors' funds. The indicators for FP were ROA and return on sales (ROS). The findings indicated that FP was negatively affected by its CS. This could be attributed to a higher reliance on equity rather than debt which results in a higher cost of capital and reduced profitability. Iavorskyi (2013) examined the influence of CS on FP in Ukraine, utilising a sample of 16,500 firms from 2001 to 2010. CS was assessed using total leverage, while FP was evaluated through ROA, EBIT margin and total factor productivity. The findings indicated that CS negatively impacts FP, with the researcher asserting that leverage has a more positive influence on low-growth firms compared to high-growth firms.

Conversely, Ayaz et al. (2021) examined the impact of CS on FP in Malaysia. From 2005 to 2016, five hundred twenty-eight non-financial firms were analysed. CS was measured using market leverage and total leverage. At the same time, FP was assessed through ROA, ROE, gross margin and Tobin's Q. The findings showed that CS positively affected FP as indicated by Tobin's Q, ROA and ROE. This could be attributed to firms having moderate levels of debt and an optimal capital structure which enhance FP. Sakr and Bedeir (2019) studied the influence of CS on FP by analysing sixty-two non-financial companies in Egypt from 2003 to 2016. CS was assessed using ratios of total debt to total assets, short-term debt to total assets (STDA) and long-term debt to total assets (LTDA). ROA and ROE were used to measure FP. The results revealed that when ROA measured FP, CS had a negative impact. Conversely, a positive effect was observed when CS was measured using STDA and when ROE was utilised to FP. Mathur et al. (2021) investigated this relationship in Indian pharmaceutical companies from 2000 to 2018. Total debt ratio, long-term debt ratio and short-term debt ratio were proxies for CS. ROA and ROE were proxies for FP. The results showed that CS had a negative impact on FP regardless of the proxies used. This is due to the fact that debt repayment is a mandatory obligation. High reliance on debt can also lead to financial distress and operational risk. In the same vein, Do et al. (2022) studied the association between CS and FP in Vietnam from 2015 to 2020. CS was assessed by STDA and LTDA. FP was assessed using ROA and Tobin's Q. The results showed that when ROA measured FP, CS had a negative impact. This is due to the fact that interest payments on debt have to be paid regardless of whether the company was profitable or not, reducing cash inflows. Failure to fulfil those obligations can lead to

bankruptcy. Conversely, when Tobin's Q measured FP, STDA did not affect FP, but was negatively affected by LTDA. Additionally, Pandey and Sahu (2017) measured CS by D/E, while ROA measured FP and return on net worth in India from 2009 to 2016. Results indicated that there is a negative association between CS and FP. Finally, Chadha and Sharma (2015) investigated this relationship in India by analysing four hundred twenty-two firms from 2003 to 2013. CS was assessed using the debt-to-equity ratio, while FP was measured through ROE, ROA and Tobin's Q. The findings showed that when ROE was used to measure FP, CS had a significant negative effect which can be attributed to a high cost of capital when relying more on equity which negatively affects the value of the firm. Conversely, when FP was assessed by Tobin's Q and ROA, it was unaffected by CS.

Due to the fact that higher financial risk is associated with higher leverage, especially in a volatile economic environment like Egypt, and due to the fact that most of the aforementioned findings indicated a negative impact of CS on FP, we have decided to formulate our main research hypothesis as follows – H1: CS negatively and significantly impacts FP.

1.5.2. Capital structure, firm performance and agency costs nexus

Ahmed et al. (2023) explored how AC influences the relationship between CS and FP in Iranian manufacturing companies. The study analysed a sample of 165 firms from 2011 to 2019. CS was measured using the debt-to-asset ratio and the debt-to-market capitalisation ratio. FP was assessed through EPS, ROA and Tobin's Q. The asset utilisation ratio (AUR) and the operational expense ratio indicated AC. The findings showed that, when measuring FP with Tobin's Q, AC had a negative moderating effect. However, when using EPS and ROA, and the AUR measured AC, a significant positive moderating effect of AC on FP was observed. This is due to the fact that when assets are utilised efficiently, agency costs can be mitigated which positively affects performance. However, when asset utilisation goes beyond a certain threshold, it may discourage further investing in the company as it becomes harder to enhance performance.

Pranata and Nugroho (2025) studied how AC moderates the relationship between CS and FP in non-financial firms listed on the Indonesia Stock Exchange (IDX) from 2020 to 2022. CS was measured using the debt-to-asset ratio and debt-to-market capitalisation, while FP was evaluated through Tobin's Q, EPS and ROA. Lastly, AC was assessed using AUR. The findings showed that AC positively moderates the relationship described earlier. This indicates that utilising assets efficiently can reduce a firm's losses that result from relying on higher levels of debt.

Due to the fact that agency costs can enforce control mechanisms to enhance the benefits of debt and mitigate its adverse effects, and due to the fact that most

of the aforementioned findings indicated a positive moderation effect of AC on the relationship between CS and FP, we have decided to formulate our main research hypothesis as follows – H2: AC positively and significantly moderates the relationship between CS and FP.

2. Methodology

2.1. Data description

This research uses panel data, consisting of a sample frame of twenty non-financial firms over ten years from 2014 to 2023, which is due to the fact that markets stabilised in 2014 after the political and economic turmoil from 2011 to 2013. This research employed a judgmental sampling scheme where the initial sample included all thirty firms in the Egyptian Exchange (EGX30); however, banks and financial institutions were excluded due to their unique nature. Additionally, any companies with missing data were removed as shown in Table 1. This study uses a balanced panel with two hundred observations. The data for this research were exclusively collected from the DataStream database, which provides extensive financial information, including annual reports, financial statements and relevant firm-level metrics for firms listed on EGX30.

Table 1. Sample selection

Description	Number of observations
Initial sample (over 10 years)	300
Less: banks and financial firms	90
Less: firms with unavailable data	10
Final sample	200

Source: authors' compilation.

2.2. Description and measurement of variables

The dependent variable, FP, is measured by ROE which gauges a firm's profitability and efficiency (Ayaz et al., 2021). The independent variable, CS, is measured by the debt-to-equity ratio in order to understand how much debt a firm is

utilising compared to equity (Ayaz et al., 2021). The moderating variable, AC, was assessed using AUR which assesses how a firm generates revenue by using its assets efficiently (Ahmed et al., 2023; Pranata & Nugroho, 2025). Measures, sources, and references for each variable are presented in Table 2.

Table 2. Variables, abbreviation, measure and source

Variable	Abbreviation	Measure	Source	Reference
Dependent variable				
Firm performance (return on equity)	ROE	Earnings before interest and taxes divided by total equity.	DataStream	Ayaz et al., 2021
Independent variable				
Capital structure (debt to equity ratio)	D/E	Total debt divided by total equity.	DataStream	Ayaz et al., 2021
Moderator variable				
Agency costs (asset utilization ratio)	AUR	Annual sales divided by total assets.	DataStream	Ahmed et al., 2023; Pranata & Nugroho, 2025
Control variables				
Liquidity	LQ	Current assets divided by current liabilities.	DataStream	Ayaz et al., 2021; Rouf, 2015
Tangibility	TG	Net fixed tangible assets divided by total assets.	DataStream	Ayaz et al., 2021 Nguyen & Nguyen, 2020
Firm size	FS	Natural logarithm of total assets.	DataStream	Ayaz et al., 2021; Nguyen & Nguyen, 2020; Javed et al., 2014
Business risk	BR	Standard deviation of earnings before interest and taxes divided by total assets.	DataStream	Ayaz et al., 2021

Source: authors' compilation.

2.3. Model specification

This empirical analysis was conducted using panel least squares (PLS). The research incorporated control variables alongside the moderating variable of AC. Control variables were used to minimise the influence of external factors on the analysis. This study utilises two models: (i) one that examines the relationship

between CS and FP, and (ii) one that includes AC as a moderating variable in the previously described relationship.

No-AUR regression model:

$$ROE_{it} = \alpha i + \beta_1 D/E_{it} + \beta_2 LQ_{it} + \beta_3 TG_{it} + \beta_4 FS_{it} + \beta_5 BR_{it} + \lambda_{it} + \varepsilon_{it} \quad (1)$$

AUR regression model:

$$ROE_{it} = \alpha i + \beta_1 D/E_{it} + \beta_2 LQ_{it} + \beta_3 TG_{it} + \beta_4 FS_{it} + \beta_5 BR_{it} + \beta_6 AC_{it} + \\ + \beta_7 (D/E_{it} \cdot AUR_{it}) + \lambda_{it} + \varepsilon_{it} \quad (2)$$

where:

ROE_{it} – return on equity of firm i in year t,
D/E_{it} – debt-to-equity ratio of firm i in year t,
LQ_{it} – liquidity of firm i in year t,
TG_{it} – tangibility of firm i in year t,
FS_{it} – firm size of firm i in year t,
BR_{it} – business risk of firm i in year t,
AUR_{it} – asset utilisation ratio of firm i in year t,
$(D/E_{it} \cdot AUR_{it})$ – impact of CS and AUR on FP,
λ_{it} – coefficient of variation,
ε_{it} – random error.

3. Results and discussion

3.1. Descriptive statistics

The descriptive data in Table 3 show that the average ROE for the sample is 0.215, whereas a good ROE ratio is between 0.15 and 0.2, indicating that companies efficiently utilise the equity invested by shareholders, which leads to high profitability. Ezz Steel recorded the lowest ROE of –8.053 in 2023, mainly due to a significant drop in earnings before interest and taxes (EBIT), caused primarily by higher manufacturing costs due to exchange rate differences. In contrast, Ezz Steel reached the highest ROE of 1.09 in 2018. This increase was attributable to a rise in production volumes, higher sales and a decrease in the cost of goods sold, which led to a 27% increase in gross profit compared to the previous year which was the result of better pricing power. A good D/E ratio is between 1 and 1.5. Since the average D/E is 0.656, it indicates a higher dependence on equity financing compared

to debt financing. The lowest D/E ratio was –8.56, recorded by Ezz Steel in 2022, likely reflecting fluctuations in raw material prices and a shift to equity financing. On the other hand, the highest D/E ratio of 8.08 was also recorded by the same company in 2018, indicating greater reliance on debt to support expansion. The average AUR is 0.994, whereas a good AUR is between 1 and 2, suggesting inefficient asset utilisation in sales generation and possibly reflecting increased managerial opportunism or agency conflicts. The lowest value of AUR 0.108 for TMG Holding was recorded in 2016, highlighting effective resource use and improved sales performance. Conversely, the highest AUR value of 3.747 was documented by Alexandria Mineral Oils Company in 2022, indicating efficient asset utilisation to generate sales and resulting in low AC. All the variables had low standard deviations which indicates that the data is closely clustered to the mean.

Table 3. Descriptive analysis of variables

Variables	Mean	Min	Max	Standard
Panel A: dependent variable				
ROE	0.215	–8.053	1.09	0.691
Panel B: independent and moderator variables				
D/E	0.656	–8.56	8.08	1.418
AC	0.994	0.108	3.747	0.738
Panel C: control variables				
LQ	1.589	0.232	6.842	0.974
TG	0.408	0.006	1.378	0.262
FS	23.217	21.142	25.815	1.149
BR	0.24	0.008	2.182	0.41

Source: authors' calculations.

3.2. Pearson coefficient correlation matrix

Table 4 shows a weak positive correlation, with a coefficient of 0.307, between D/E and ROE, indicating that moderate debt use may signal growth potential to investors, thereby boosting ROE. On the other hand, there is a weak negative correlation with a coefficient of –0.193 between FS and ROE, because when firms expand, operational costs increase, causing diseconomies of scale and lower profitability, which reduces ROE. A weak negative correlation exists between D/E and LQ, with a coefficient of –0.145, since firms relying heavily on debt must meet debt obligations through interest payments, reducing LQ. A weak positive correlation exists between TG and BR, with a coefficient of 0.295, because industries that depend

heavily on tangible assets tend to need more debt, raising the chance of default. Conversely, there is a weak negative correlation between TG and LQ, with a coefficient of –0.258, due to the difficulty of quickly converting tangible assets to cover short-term needs, which lowers LQ. A weak positive correlation exists between AC and BR, with a coefficient of 0.168, as AC arises from conflicts between managers and shareholders, potentially increasing a firm's BR when managers select higher-risk projects for personal gain. Conversely, a weak negative correlation exists between AC and FS, with a coefficient of –0.488, because larger firms tend to reduce AC through better governance. A weak negative correlation exists between FS and BR, with a coefficient of –0.306, as larger firms can utilise multiple income streams to mitigate unexpected risks. Finally, a weak negative correlation exists between FS and LQ, with a value of –0.268, since larger firms can more easily access capital markets to raise funds while maintaining low LQ. Moreover, the variance inflation factor (VIF) shows that all variables have a VIF below 5, indicating the absence of multicollinearity among the independent variables, so none need to be removed.

Table 4. Pearson coefficient correlation matrix

Variables	ROE	D/E	TG	AC	BR	FS	LQ
ROE	1.000						
D/E	0.307**	1.000					
TG	–0.071	0.025	1.000				
AC	–0.037	0.029	0.008	1.000			
BR	0.008	–0.015	0.295**	0.168*	1.000		
FS	–0.193**	–0.002	–0.068	–0.488**	–0.306**	1.000	
LQ	0.100	–0.145*	–0.258**	0.101	–0.064	–0.268**	1.000
Multicollinearity diagnostics							
VIF	–	1.04	1.258	1.514	1.238	1.688	1.458

Note: * Significant at level 10%; ** Significant at level 5%; *** Significant at level 1%.

Source: author's calculations.

3.3. Regression analysis

PLS were utilised in order to determine whether there is a significant relationship between CS and FP or not. The fixed effects model takes into account the different years that are included in the sample. However, the random effects model acknowledges the fact that there are different companies included in the sample. The Hausman test was utilised in order to determine which of the previously mentioned models is a better fit for the analysis. Since the *p*-value was greater than 0.05

as demonstrated in Table 5, the analysis relied on the results of the random effects model. Table 5 also shows that an increase of 1 unit in D/E results in a 0.154 unit increase in ROE, indicating that ROE rises when firms acquire debt at a lower cost and pursue high-yield projects. Finally, a 1-unit increase in FS causes a 0.097 decrease in ROE. This occurs because larger firms, once they reach maturity, have fewer incentives for growth as they have achieved their objectives. This prompts investors to seek alternative opportunities in the market with firms that may offer higher profits. The findings are supported by the pecking order theory, which suggests that a hierarchy should be followed in the finance acquisition process. This hierarchy starts with retained earnings, then debt, and finally equity. The rationale is that each funding source has a cost, and the ideal CS maximises the firm's value while minimising capital costs. Retained earnings and debt are more economical sources of funding than equity because, in cases of liquidation or bankruptcy, debt creditors are paid before equity investors. As a result, equity investors expect higher returns to compensate for the increased risk. This hierarchy guides firms toward an optimal CS with minimal trade-offs, ultimately improving FP. Additionally, the *R*-squared value is 0.141, which means that the model explains 14.1% of the variation in ROE. The findings show that H1 is rejected, as CS has a positive effect on FP.

Table 5. Relationship between CS and FP

Estimates of PLS	Fixed effects model		Random effects model	
	coefficient	*t*-statistic	coefficient	*t*-statistic
Constant	0.663	0.28	2.307	1.69
D/E	**0.148*****	4.32	**0.154*****	4.74
Control variables				
LQ	0.028	0.42	0.053	0.93
TG	0.431	1.33	0.001	0.01
FS	–0.032	–0.32	**–0.097***	–1.72
BR	–0.095	–0.27	–0.061	–0.36
Other statistics				
R-squared	0.115		0.141	
Number of observations	200		200	
Hausman test (*p*-value)	0.557			

Note: * Significant at level 10%; ** Significant at level 5%; *** Significant at level 1%.

Source: author's calculations.

PLS were utilised in order to determine whether AC had a significant moderation effect on the relationship between CS and FP or not. The random effects model was the better fit as the Hausman test had a *p*-value greater than 0.05 as demon-

strated in Table 6. Table 6 also shows that a 1-unit rise in AC leads to a 0.219 decrease in ROE, as AC is typically reduced by incentives that lower profitability and ROE. The interaction test results reveal that AC positively moderates the relationship between CS and FP, due to the significant reliance on debt in firms with high AC. This is because incurring debt entails servicing costs, which compel managers to prioritise the firm's best interests, thereby enhancing profitability and overall performance. Agency theory supports these findings, claiming that AC decreases as debt is used, aligning the interests of managers and shareholders. Increasing debt reduces managers' free cash flow, limiting any discretionary behaviour they might display. Additionally, the *R*-squared value for this model is 0.152, meaning that the model explains 15.2% of the variation in ROE. The findings confirm that H2 is supported, as AC positively influences the association between CS and FP.

Table 6. Impact of AC on the relationship between CS and FP

Estimates of PLS	Fixed effects model		Random effects model	
	coefficient	*t*-statistic	coefficient	*t*-statistic
Constant	2.319	1.0.98	3.925	2.58
D/E	**0.136*****	4.06	**0.152*****	4.72
AC	**–0.4*****	–3.10	**–0.219****	–2.43
Moderating effect				
D/E x AC	**0.103*****	4.19	**0.111*****	4.84
Control variables				
LQ	0.024	0.35	0.05	0.88
TG	0.412	1.27	0.015	0.07
FS	–0.023	–0.23	–0.077	–1.39
BR	–0.09	–0.25	–0.057	0.166
Other statistics				
R-squared	0.110		0.152	
Number of observations	200		200	
Hausman test (*p*-value)	0.67			

Note: * Significant at level 10%; ** Significant at level 5%; *** Significant at level 1%.

Source: author's calculations.

3.4. Discussion of results

The statistical research shows that CS has a positive effect on FP measured by ROE. These findings are supported by the findings of Ayaz et al. (2021) who stud-

ied this relationship on Malaysian firms. On the other hand, these findings contradict earlier studies, including Rouf (2015), which analysed firms listed on the Dhaka Stock Exchange from 2008 to 2011; Pandey and Sahu (2017), which examined Indian manufacturing firms from 2009 to 2016; Muhammad and Shah (2014), which focused on firms listed on the Karachi Stock Exchange from 2009 to 2013; Al-Taani (2013), which studied a sample of 45 manufacturing companies in Jordan from 2005 to 2009; and Chadha and Sharma (2015), which examined 422 Indian companies from 2003 to 2013. All of these studies found that, when ROE measures FP, FP was negatively and significantly affected by CS. Differences in results between this research and previous studies can be attributed to the use of different contexts and periods during which countries face varying economic and political conditions that may affect the analysis.

The findings showed that AC positively influences the relationship between CS and FP, as managers tend to make unbiased decisions regarding the efficient use of assets when the firm takes on additional debt to cover interest payments. The findings of Ronoowah and Seetanah (2024) support this, since they examined the relationship between CS, FP and AC in Mauritian firms from 2009 to 2019. Proper asset utilisation reduces the negative impact of leverage on FP and lowers AC. These results were confirmed by Pranata and Nugroho (2025), who conducted similar research on Indonesian companies from 2020 to 2022. When organisations manage their assets effectively, valuation issues and profitability losses caused by high debt levels are addressed. Among the control variables, only FS showed statistically significant results, indicating a negative effect on FP. This happens because, over time, larger organisations often experience reduced profitability as the benefits of size no longer outweigh the costs (Yadav et al., 2022). In contrast, TG, LQ and BR showed statistically insignificant effects.

3.5. Robustness test

To verify the validity of the results obtained from the PLS and determine whether the relationship between CS and FP is both positive and significant, equity-to-assets (E/A) was used as an additional measure for CS. Both the fixed effects model and the random effects model were utilised with the Hausman Test suggesting that the random effects model was a better fit.

Table 7 indicates that an increase of 1 unit in E/A leads to a 0.551 increase in ROE, which can be an indicator that firms are relying more on equity, leading to reduced interest expenses. This leads to an improvement in net income compared to the firm's equity base, resulting in an improved ROE. Lastly, a 1-unit increase in FS results in a 0.092 decrease in ROE, because as firms grow, they may have fewer

investment opportunities with high returns. It can also be attributed to the fact that firms tend to become less efficient as they grow, which also reduces ROE. Additionally, the *R*-squared is 0.071, which means that the model explains 7.1% of the variation in ROE.

Table 7. Additional analysis: equity-to-assets

Estimates of PLS	Fixed effects model		Random effects model	
	coefficient	*t*-statistic	coefficient	*t*-statistic
Constant	–0.193	–0.08	**2.244***	1.70
E/A	0.363	0.85	**0.551***	1.88
Control variables				
LQ	–0.018	–0.24	–0.033	–0.51
TG	0.547	1.61	–0.181	–0.78
FS	0.002	0.02	**–0.092***	–1.70
BR	–0.041	–0.11	–0.066	–0.42
Other statistics				
R-squared	0.025		**0.071**	
Number of observations	200		200	
Hausman test (*p*-value)	0.068			

Note: * Significant at level 10%; ** Significant at level 5%; *** Significant at level 1%.

Source: author's calculations.

Conclusions and remarks

This research aims to examine the impact of CS on FP, considering the moderating effect of AC. A sample of 20 non-financial companies from the EGX30 was used from 2014 to 2023. The analysis employed three different panel least squares methods, with the Hausman test indicating that the random effects model was the most suitable choice. The results showed a significant and positive relationship between CS and FP, as effective use of debt and strategic investments can significantly enhance FP. AC has a positive influence on the relationship between CS and FP. Managers are less likely to prioritise their interests over those of the firm and shareholders when there is heavy reliance on debt for projects. Regarding control variables, only company size showed a negative effect on FP, while LQ, TG and BR were found to be insignificant.

This research has important implications for stakeholders. Firstly, firms need to evaluate the costs and benefits of different financing sources before choosing

the most appropriate option, as the ideal CS is heavily influenced by factors such as industry, firm size, cash flow predictability, corporate goals and shareholder expectations. Secondly, companies in the maturity phase of their lifecycle should pursue projects that promote growth beyond their initial objectives to attract investors who may be drawn to smaller firms offering higher returns. Thirdly, governments should implement initiatives to improve entrepreneurs' financial literacy, thereby fostering a better understanding of how various financing sources can impact the organisation as a whole.

Some limitations encountered during data collection and analysis may have affected the generalisability and depth of the results. Initially, financial statements for 2013 were unavailable and thus excluded from the dataset. This could have impacted the continuity and accuracy of the time series analysis. Additionally, although the original research design aimed to include market-based indicators of CS (e.g. market leverage) and FP (e.g. Tobin's Q), the limited availability of published market data restricted the precise calculation of these variables. As a result, the analysis mainly relied on accounting-based proxies, which might not adequately reflect market opinions or external assessments of FP and leverage. Finally, the literature review revealed a significant gap as no previous studies established a meaningful relationship between CS, as indicated by D/E, and FP, measured by ROE. This posed a challenge during the discussion phase, as it limited the amount of prior empirical evidence available to benchmark or validate the current findings.

Future research should extend the study period beyond ten years to better detect long-term trends and cyclical effects that may influence the relationship between CS and performance. Additionally, expanding the geographic scope to include various countries could enhance the findings by accounting for differences in political, regulatory and economic environments. Lastly, due to the fact that the *R*-squared values are low as is acceptable in social sciences considering that it deals with complex human behaviour which is everchanging and hard to predict (Ozili, 2023), other independent variables should be used to better explain the variation in ROE.

Appendix

All firms in EGX30 as of 2024

Abou Kir Fertilizers	EGS38191C010	ABUK.CA	Basic Resources
Alexandria Mineral Oils Company	EGS380P1C010	AMOC.CA	Basic Resources
Delta Sugar	EGS30201C015	SUGR.CA	Food, Beverages and Tobacco
Eastern Company	EGS37091C013	EAST.CA	Food, Beverages and Tobacco
Edita Food Industries	EGS305I1C011	EFID.CA	Food, Beverages and Tobacco
Egyptian International Pharmaceuticals	EGS38081C013	PHAR.CA	Healthcare and Pharmaceuticals
El Sewedy Electric	EGS3G0Z1C014	SWDY.CA	Industrial Goods, Services and Automobiles
Emaar Misr for Development	EGS673Y1C015	EMFD.CA	Real Estate
Ezz Steel	EGS3C251C013	ESRS.CA	Industrial, Construction and Materials
GB Auto	EGS673T1C012	GBCO.CA	Industrial Goods, Services and Automobiles
Ibnsina Pharma	EGS512O1C012	ISPH.CA	Healthcare and Pharmaceuticals
Juhayna Food Industries	EGS30901C010	JUFO.CA	Food, Beverages and Tobacco
Madinet Masr for Housing and Development	EGS65571C019	MASR.CA	Real Estate
Misr Fertilizers Production Co	EGS39061C014	MFPC.CA	Basic Resources
Orascom Development Egypt	EGS70321C012	ORHD.CA	Real Estate
Oriental Weavers	EGS33041C012	ORWE.CA	Textile and Durables
Palm Hills Development Company	EGS655L1C012	PHDC.CA	Real Estate
Sidi Kerir Petrochemicals	EGS380S1C017	SKPC.CA	Basic Resources
Telecom Egypt	EGS48031C016	ETEL.CA	IT, Media and Communication Services
TMG Holding	EGS691S1C011	TMGH.CA	Real Estate
Abu-Dhabi Islamic Bank (ADIB-Egypt)	EGS60111C019	ADIB.CA	Banking
Beltone Holding	EGS691G1C015	BTFH.CA	Non-bank Financial Services
Credit Agricole Egypt	EGS60041C018	CIEB.CA	Banking
EFG Holding	EGS69101C011	HRHO.CA	Non-bank Financial Services
E-finance for Digital and Financial Investments	EGS743O1C013	EFIH.CA	IT, Media and Communication Services
Fawry for Banking Technology and Electronic Payment	EGS745L1C014	FWRY.CA	Non-bank Financial Services

Qalaa for Financial Investments	EGS73541C012	CCAP.CA	Non-bank Financial Services
Raya Holding for Financial Investments	EGS690C1C010	RAYA.CA	Non-bank Financial Services
Non-financial firms with incomplete data			
Alexandria Containers and Goods	EGS42111C012	ALCN.CA	Shipping and Transportation Services Sector

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